ENERGY STAR® Program Requirements for Telephony

DRAFT 1.1 Eligibility Criteria

Below is the **DRAFT 1.1** product specification for ENERGY STAR qualified telephony. A product must meet all of the identified criteria if it is to be labeled as ENERGY STAR by its manufacturer.

1) Definitions: Below is a brief description of telephony products and their common operational modes as relevant to ENERGY STAR. The ENERGY STAR specification focuses on reducing energy consumption while the product is in the Standby Mode.

A. Cordless Telephone: A commercially available electronic product with a base station and a handset whose purpose is to convert sound into electrical impulses for transmission. Most of these devices require a wall pack for power, are plugged into an AC power outlet for 24 hours a day, and do not have a power switch to turn them off. To qualify, the base station of the cordless phone must be designed to plug into a wall outlet and there must not be a physical connection between the portable handset and the phone jack. Cellular telephones, which use radio waves to connect to the cellular telephone carrier, are not considered cordless telephones and are not eligible to carry the ENERGY STAR label under this specification.

B. Answering Machine: A commercially available electronic product—also known as telephone answering devices (TAD) —whose purpose is to provide analog or digital storage of outgoing and incoming telephone messages by connecting to the telephone line between the phone and the phone jack. Most of these devices require a wall pack for power and are plugged into an AC power outlet for 24 hours a day. To qualify, the answering machine must be designed to plug into a wall outlet.

C. Combination Cordless Telephone/Answering Machine: A commercially available electronic product in which the cordless telephone and answering machine are combined into a single unit and which meets all of the following criteria: the answering machine is included in the base station of the cordless telephone; it is not possible to measure the power requirements of the two components separately without removal of the telephone casing; and the unit is connected to the wall outlet through a single power cable. Most of these devices require a wall pack for power, are plugged into an AC power outlet for 24 hours a day, and do not have a power switch to turn them off. To qualify, the combination unit must be designed to plug into a wall outlet.

D. Wall Pack: A power supply commonly shipped with consumer electronic products that plugs into an AC power outlet on the wall.

E. Standby Mode: The product is connected to a power source and is inactive (i.e., the unit is not transmitting a conversation or recharging a low battery); in TAD the product is idle. In this mode, conventional units may consume energy to operate circuitry and to overcharge rechargeable batteries.

F. Active Mode: The product is connected to a power source and is transmitting telephone conversation, and/or playing/recording a message, and/or supplying current to a low battery to charge it. The power requirement in this mode is typically greater than the power requirement in Standby Mode.

G. Disconnect: The product is disconnected from all external power sources.

2) Qualifying Products: For the purposes of ENERGY STAR, telephony products include analog and digital cordless telephones, answering machines, and combination cordless telephones/answering

machines. Any cordless telephone, answering machine, or combination cordless telephone/answering machine that is marketed to the consumer as such and meets the product definition in Section 1 is eligible for the ENERGY STAR label.

3) **Energy-Efficiency Specifications for Qualifying Products**: Only those products listed in Section 2 that meet the criteria below may qualify as ENERGY STAR.

Table 1: Energy-Efficiency Criteria for ENERGY STAR Qualified Telephony

Product Category	Standby Mode
• Answering Machine with external power supply • Cordless Telephone with external power supply • Combination Cordless Telephone/Answering Machine with external power supply	≤ 0.5 Watts

EPA Comments: ENERGY STAR welcomes industry feedback on its proposed energy-efficiency specification of 0.5 watts in standby mode. Recent research indicates that nearly 90 percent of all telephony energy is used during standby, and much of that energy is for overcharging a fully charged battery. Opportunities to improve energy performance include incorporating energy-efficient power supplies, adding "smart" chargers to prevent overcharging of full batteries in cordless phones and combination units, and changing circuit design.

Please note that the primary objective of ENERGY STAR is to recognize the most energy-efficient models in the market through the use of the ENERGY STAR label. It is not ENERGY STAR's intention to design a specification that will allow every model to qualify for the label. ENERGY STAR believes that this draft specification will recognize a reasonable sub-set of the marketplace.

4) **Power Measurement**: Manufacturers are required to perform tests and self-certify those product models that meet the ENERGY STAR guidelines. The power requirement shall be measured from the outlet or power supply to the product under test (PUT). The product manufacturer (i.e., ENERGY STAR Partner) shall measure the average true power (in Watts) of the product. When performing measurements to self-certify a product model, the products under test must be in the condition (e.g., configuration and settings) shipped to the customer.

5) **Test Criteria**: To ensure consistency in measuring the power requirements for electronics products, this protocol should be followed. Outlined in Section A are the ambient test conditions that should be respected when performing power measurements. These conditions ensure that outside factors do not affect the test results and that the test results can be reproduced. Sections B and C describe the specifications for testing equipment and the test method, respectively. Section D reviews responsibilities, while Section E covers continuing verification.

A. Test Conditions

General Criteria:

Total Harmonic Distortion (Voltage):	< 3% THD
Ambient Temperature:	22ºC ± 4ºC

Terminations: External speaker terminals terminated per 3.6.2.2 (IEC 107-1)

Market-Specific Criteria:

Market:	**United States**	**Europe and Australia**	**Japan**
Voltage:	115 V RMS ± 3 V RMS	230 V RMS ± 10 V RMS	100 V RMS ± 5 V RMS & 200 V RMS ± 10 V RMS
Frequency:	60 Hz ± 3 Hz	50 Hz ± 3 Hz	50 Hz ± 3 Hz & 60 Hz ± 3 Hz

Note: Testing needs to be done only at a voltage and frequency in the above range. It is not necessary to test all combinations of high voltage/low frequency, high voltage/high frequency, etc.

B. Test Equipment: Manufacturers should measure and report the true standby power[1] requirements of the product. Doing so necessitates the use of a true power watt meter. Because there are many watt meters from which to choose, manufacturers need to exercise care in selecting an appropriate model. The following items should be considered when procuring equipment and performing the test:

1. AC Power Source (with sufficient output current for the test unit such that it meets the requirement for AC line voltage, frequency stability, and THD).
2. True Power Meter (with sufficient accuracy, resolution, crest factor rating, and bandwidth).
3. Oscilloscope with Current Probe (to monitor AC line current waveform, amplitude, and frequency. Optional but recommended).
4. True RMS Volt Meter (to verify voltage at the input of test unit. Optional if AC source output is sufficiently accurate).
5. Frequency Counter (to verify frequency at the input of test unit. Optional if AC source output is sufficiently accurate).

Crest Factor: Electronics equipment may draw current that is not sinusoidal.[2] While virtually any watt meter can measure a standard current waveform, it is more difficult to select a watt meter when irregular current waveforms are involved.

[1] True power is defined as (volts)x(amps)x(power factor) and is typically reported as watts. Apparent power is defined as (volts)x(amps) and is usually expressed in terms of VA or volt-amps. The power factor for equipment with switching power supplies is always less than 1.0; therefore, true power is always less than apparent power.

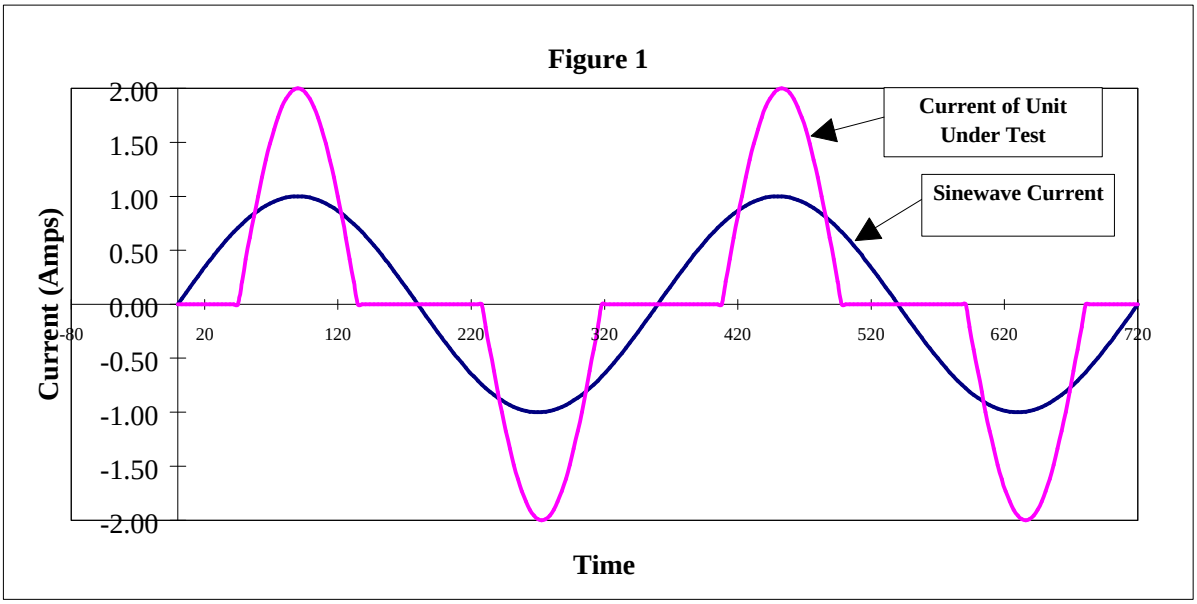
[2] The crest factor of a current waveform is defined as the ratio of the peak current (amps) to the RMS current (amps). The crest factor for a sinusoidal 60 Hz current waveform is always 1.4. The crest factor for a current waveform associated with a product containing a switching power supply will always be greater than 1.4 (though typically no higher than 8).

It is critical that the watt meter selected be capable of reading the current drawn by the product without causing internal peak distortion (i.e., clipping off the top of the current wave). This requires a review of the meter's crest factor rating and the current ranges available on the meter. Better quality meters will have higher crest factor specifications and more choices of current ranges.

To determine the crest factor rating requirement of the meter and the proper current range settings, the peak current (amps) draw of the product under test in standby mode must first be measured. This can be accomplished using an oscilloscope with a current probe.

A current range on the meter must be selected that is sufficient to register the peak current. Specifically, the full-scale value of the selected current range multiplied by the crest factor of the meter (for current) must be at least 15 percent greater than the peak current reading from the oscilloscope to compensate for any measurement error. (Note: It is difficult to measure within 5 percent using an analog oscilloscope.) For example, if a watt meter has a crest factor of 4 and the current range is set on 3 amps, the meter can register current spikes of up to 12 amps. If measured peak current is only 6 amps, the meter would be satisfactory. If, however, the current range is set too high, the meter may lose accuracy in measuring non-peak current. Therefore, some delicate balancing is necessary. When choosing a meter, make sure that the crest factor is given for the current level that you desire.

Figure 1



Frequency Response: Another issue to consider when selecting a watt meter is the frequency response rating of the meter. Electronics equipment may cause harmonic waveforms that can lead to inaccuracies in the power measurements. For example, electronics equipment powered by switching power supplies typically produces odd harmonics up to the 21st. To ensure that the harmonics are properly addressed, ENERGY STAR recommends the use of a watt meter with frequency response of at least 3 kHz. This will account for harmonics up to the 50th, which is recommended by IEC 555.

Resolution: Manufacturers should choose a watt meter that can provide resolution of 0.1 watt or better.

Accuracy: Catalogues and specification sheets for watt meters typically provide information on the accuracy of power readings that can be achieved at different range settings. If the power measurement is very close to the energy-efficiency guideline specified in these Program

Requirements (Eligibility Criteria), a test procedure with greater accuracy will be necessary. For example, if the ENERGY STAR specification is 1.0 watt or less *and* the resulting accuracy of the watt meter at the test settings is ± 0.1 watts, then a power measurement of less than 0.9 watts will ensure that the product qualifies for ENERGY STAR.

Calibration: To maintain their accuracy, watt meters should be calibrated every year with a standard that is traceable to the US National Bureau of Standards (NBS).

C. Test Method: Following are the test steps for measuring the true power requirements of the product under test (PUT) in standby mode:

1. Power the PUT. When rechargeable batteries are involved, the PUT must be fully charged (allow up to 24 hours). The PUT must be in an on-hook state. Cordless phones and combination units must have the handset on the cradle.

2. Power on all test equipment and properly adjust operation range. Connect the test equipment and PUT.

3. Check that the PUT has all settings equal to the factory default settings (i.e., unit must be in the condition shipped to the customer).

4. Verify that the PUT is in standby mode (not disconnect mode).

5. Either verify that the wall outlet power is within specifications or adjust the AC power source output as described in Section A (e.g., 115Vrms ± 3Vrms, 60Hz ± 3Hz).

6. Set the power meter current range. The selected full scale value multiplied by the crest factor rating (Ipeak/Irms) of the meter must be greater than the peak current reading from the oscilloscope.

7. After the PUT reaches operating temperature and the readings on the power meter stabilize (up to 90 minutes), take the true power reading in watts from the power meter.

8. Record the test conditions and test data. The measurement time shall be sufficiently long to measure the correct average value to within a +10% - 0% error, up to 24 hours but no less than 2 hours. If the device has different standby modes that can be manually selected, the measurement should be taken with the device in the most power consumptive mode. If the modes are cycled through automatically, the measurement time should be long enough to obtain a true average that includes all modes.

D. Responsibilities: ENERGY STAR's test criteria are not mandatory, but they will be distributed to outside parties such as buyers and the press. Following the test criteria and producing accurate test results will assist manufacturers in qualifying and labeling products as ENERGY STAR. Companies may determine the appropriate level of stringency and accuracy for their own testing based on their specific products.

E. Continuing Verification: This testing procedure (protocol) describes the method by which a single unit may be tested and qualify as an ENERGY STAR labeled product. An ongoing testing process is highly recommended to ensure that products from different production runs qualify for ENERGY STAR. A model may qualify as ENERGY STAR if testing indicates that 95 percent of the units sold under this model name/number will meet the specifications contained in these Program Requirements (Eligibility Criteria).

6) Effective Date: The date that manufacturers may begin to qualify products as ENERGY STAR will be defined as the *effective date* of the agreement. ENERGY STAR proposes an effective date of **<TBD>**.

7) Future Specification Revisions: ENERGY STAR reserves the right to change the specification should

technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through industry discussions.